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(54) Moulded shoe sole, able to take in air from the inside of the shoe and push it out from the heel

(57) The instant invention concerns a moulded sole (1) which can take in air from the inside of the shoe and expel it from the heel, due to the pumping action carried out by a cushion (9), able to elastically deform, housed within a chamber (2), on the bottom of the sole and

communicating, by means of a longitudinal channel (4) blocked by a single acting valve (8), with a ring (5) on the heel (6) which communicates with the outside by means of a vent area (7).

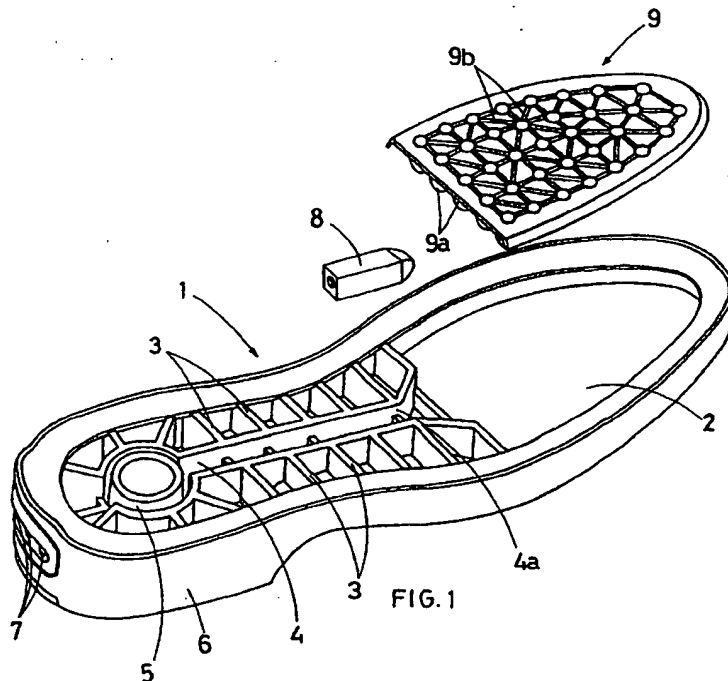


FIG. 1

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## Description

The instant patent application for an industrial invention concerns a moulded shoe sole, able to take in air from the inside of the shoe so as to allow the foot to breathe in an effective and beneficial manner.

This article has been designed with the precise intention of increasing the comfort of closed shoes, which are usually unable to allow the foot to breathe properly.

It is known, in fact that it is impossible for a foot inside a closed shoe to get sufficient air, so much so, that in cases of excessive perspiration, the skin becomes increasingly sensitive, often to the extent that the skin's aspect is altered.

The sole, according to the invention, in spite of the fact that it appears to be like a moulded sole of the conventional type, is able to take in air from the inside of the shoe and expel it to the outside by means of a discharge channel which runs longitudinally along the sole itself and comes to an end on a vent positioned at the heel.

The suction action is obtained by means of a cushion, which deforms elastically, and is positioned within a housing and pumping chamber on the bottom of the sole; this cushion will be subjected to repeated contractions as a result of the constant pressing action carried out by the ball of the foot when walking.

In practice, this cushion effectively carries out a pumping action, of the type produced by a simple piston, creating an intermittent air flow which passes through the inside of the shoe from the heel to the toe, from where the air taken in flows into the sole underneath, going along its longitudinal channel in the opposite direction until it reaches the aforementioned vent, positioned on the back of the heel.

The mouth of said channel is blocked by a single acting valve, which lets the air through on its way to the heel, but also prevents this air from flowing back towards the toe.

More precisely, when the aforementioned cushion is squashed by the foot, the air contained in the chamber underneath it is sufficiently compressed to open and cross the said single acting valve; when the foot does not exert the weight of the body on the cushion, it tends due to its elasticity, and in contrast to its previously compressed position, to push back up again, thereby creating a slight hollow in the chamber below it.

This hollow causes air to be reclaimed exclusively from the inside of the shoe, due to the fact that the single acting valve prevents any outside air from being sucked back in and from flowing within said suction chamber.

The elastic deformation of the cushion, absolutely necessary in order to obtain the pump effect just described, indirectly provides the foot with a soft resting surface, able to absorb any impact the ball of the foot may have with the ground.

For further clarity of explanation, the description continues with reference to the attached drawings,

reproduced for illustrative and not limitative purposes, wherein :

- Fig.1 shows a perspective and exploded drawing of the various components of the sole according to the invention;
- Fig. 2 is the view as seen from the top, of the sole according to the invention;
- Fig. 3 is a perspective reproduction of a sectioned portion of the cushion;
- Fig. 4 is the transversal section of the sole along the IV-IV plane of Fig.2;
- Fig. 5 shows the fitted and hygienic inner sole to be used in combination with the sole according to the invention.

With reference to the abovementioned figures, the sole (1) in question is produced from moulding and has an empty chamber (2) on the bottom and a network of rigid ribs (3) in the middle and at the heel.

More precisely said network is longitudinally crossed by a central channel (4), which renders the chamber communicating with a ring (5), on the heel area (6).

This ring (5) communicates with the outside by means of a series of vents (7) on the back of the heel.

On the mouth (4a) of the channel (4), there is a single acting valve (8) of the conventional type, which allows air to flow from the chamber (2) towards the ring (5), but not in the opposite direction.

The chamber (2) precisely houses a moulded cushion (9), which has on its lower surface, a series of overturned domes (9a), which effectively provide support for the cushion (9), which rests on the bottom of the chamber (2) precisely on top of said domes (9).

The elastic deformation of the domes (9a) under pressure allows the cushion (9) to carry out the pumping action described above.

On the top face of the cushion (9), there is a net of surface channels (9b), made during moulding, which branch off radially from the cavity of each dome (9a) and head towards the cavity of the immediately surrounding domes (9).

On the bottom of said channels (9b) there are through holes (10) which render the aforementioned chamber (2) communicating with the inside of the shoe, on top of the cushion (9).

It should be said that the fitted inner sole (11) and the hygienic inner sole (12), to be used in combination with the sole (1) according to the invention should have, as illustrated in Fig.5, a closely packed series of through holes (11a and 11b) on the bottom, through which the air contained inside the shoe can flow, obviously passing through the holes (10) of the cushion (9) within the chamber (2).

**Claims**

1. Moulded shoe sole, able to take in air from the inside of the shoe and expel it through the heel, characterised by the fact that it comprises a sole (1), made from moulding, having on the bottom, a chamber (2) which, by means of a longitudinal channel (4) obstructed by a single acting valve (8) is rendered communicating with a ring (5), positioned in the heel area (6), and in its turn communicating with the outside by means of a series of vents (7), on the back of the heel (6); it being provided that in the chamber (2), there is a cushion (9), also made from moulding, which has a series of overturned domes (9a) on its bottom surface, while on its top surface there is a network of small channels (9b), which branch off radially from the cavity of each dome (9a) to head towards the cavity of the immediately surrounding domes (9); it being also provided that on the bottom of said channels (9b) there be through holes (10).

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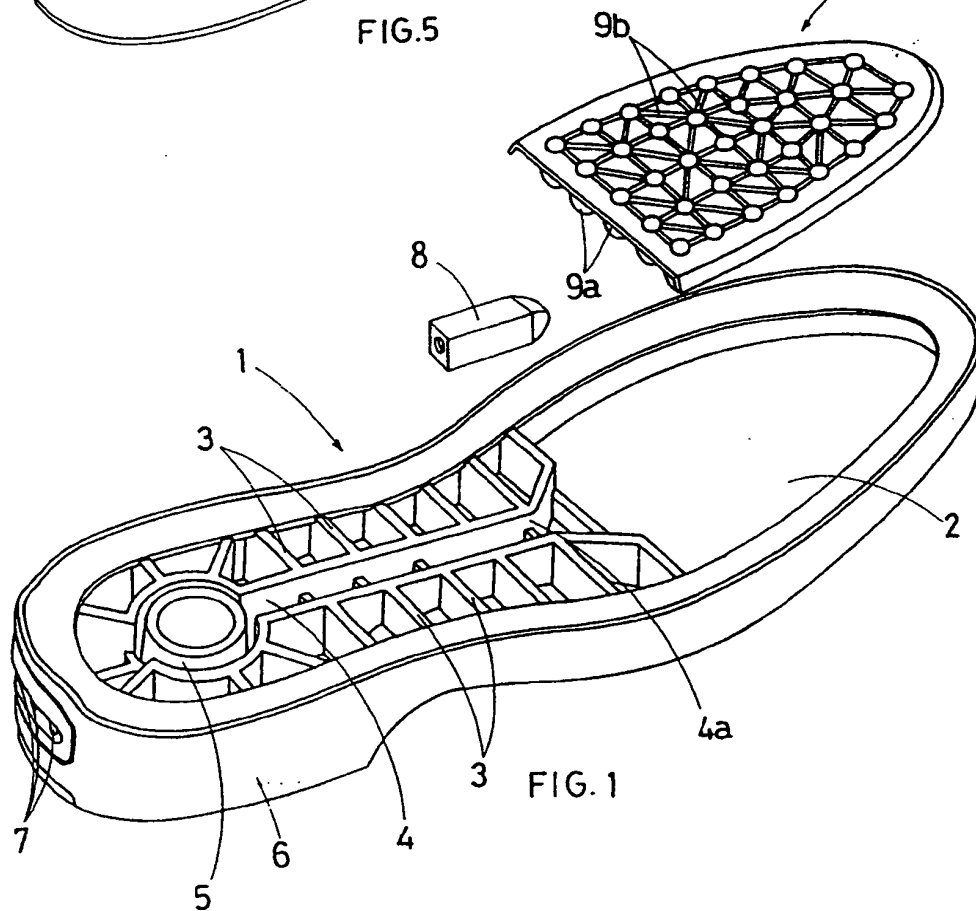
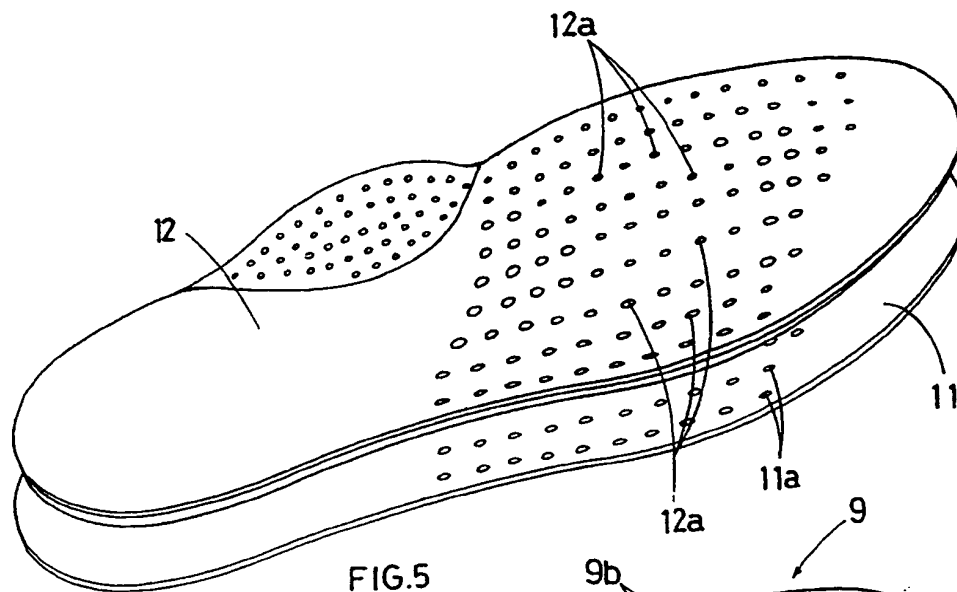
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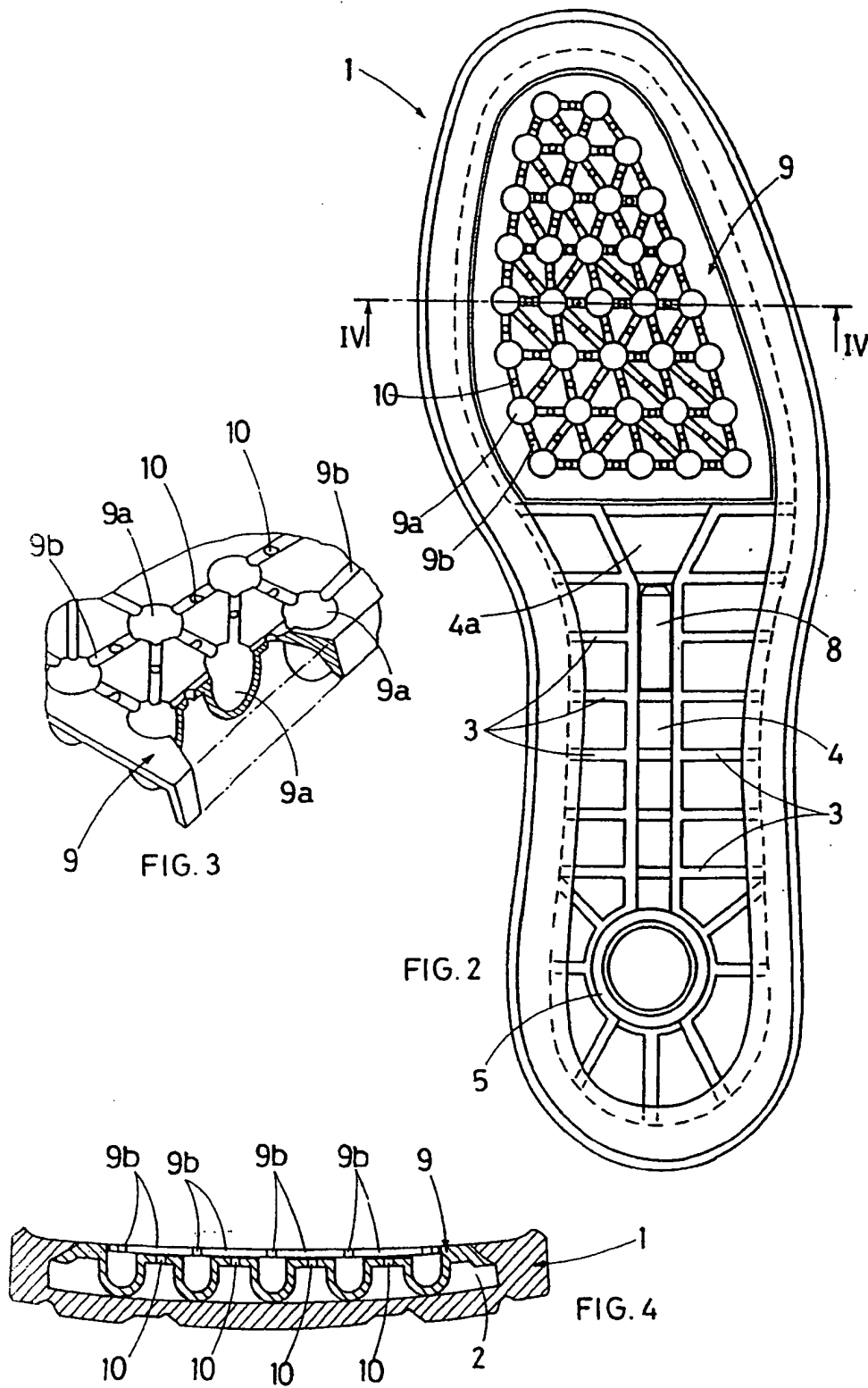
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## EUROPEAN SEARCH REPORT

Application Number  
EP 95 83 0517

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.CL.6)
A	GB-A-2 262 024 (PEARSE) 9 June 1993 * the whole document *	1	A43B7/06
A	US-A-1 660 698 (WILLIAMS, SR) * the whole document *	1	
A	FR-A-1 026 777 (VOELTZEL) * the whole document *	1	
P, A	DE-A-43 39 104 (ENGROS SCHUHHAUS AG) 18 May 1995 * column 2, line 60 - line 63; figure 6 *	1	
A	FR-A-2 684 525 (KIM SANG DO) 11 June 1993 * page 7, line 24 - line 32; figures 1,3 *	1	
A	DE-A-30 10 824 (SALAMANDER AG) 1 October 1981 * page 7, paragraph 3 - paragraph 5; figures *	1	
			TECHNICAL FIELDS SEARCHED (Int.CL.6)
			A43B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 22 July 1996	Examiner Scholvinck, T
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